UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,372	03/25/2004	Shin Yasuda	119258	4726

25944 7590 11/28/2008

OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
CHANG, AUDREY Y	
ART UNIT	PAPER NUMBER
2872	
MAIL DATE	DELIVERY MODE
11/28/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/808,372	YASUDA ET AL.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *August 10 and 25, 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10,12-18,29,31 and 33-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10,12-18,29,31 and 33-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/3/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendments filed on August 10 and 25, 2008, which are entered into filed.
- By these amendments, the applicant has amended claims 10-12-13, 29, 31, 33-35 and has canceled claims 1-9, 11, 19-28, 30, 32, and 36-45.
- Claims 10, 12-18, 29, 31, and 33-35 remain pending in this application.

Response to Amendment

1. The amendment filed on August 25, 2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **claims 10, 12, 13, 29, 31, have been amended** to include a first set of pages for first set of holograms and second set or new set of pages for second set or new set of holograms, with the recording start positions for the two sets shifted. the specification fails to disclose explicitly to include a first set of pages for recording first set of holograms and second sets of pages for recording second set (or new set) of hologram and the recording start positions for the first set of holograms and second set of holograms are shifted.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 10, 12-18, 29, 31, 33-35 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on the newly added matters are set forth in the section "response to amendment" above.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 10, 12-18, 29, 31 and 33-35 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 10, 29 and 31 have been amended to include that the first and second (or new) set of holograms are recorded in substantially the same location yet the claims also recite that the recording start positions are shifted. These two conditions seems to be contradicting to each other.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 10, 14, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Tanaka et al (PN. 6,301,028) and in view of the patent issued to Curtis et al (PN. 6,614,566).

Claims 10, 29 and 31 have been significantly amended that necessitate the new grounds of rejections.

With regard to claims 10, 29 and 31:

Tanaka et al teaches a *holographic recording apparatus and method* that is comprised of a *laser light beam* (15, Figure 2) for emitting a *coherent* light beam, a *beam splitter* (16) for separating the coherent light beam into a *reference* light beam and a *source* light beam (that will serve as the signal light beam), wherein the reference light beam is deflected by a mirror (17) so that optical paths for the reference light beam and the signal light beam are separated and are led to irradiate a volume holographic memory (10), *serves as the optical recording medium*, at the same time to record the interference pattern between the reference light beam and the signal light beam as hologram. Tanaka et al teaches that a *spatial light modulator* (12) is arranged in the optical path of the source light beam for *modulating* the source light beam in accordance with *recording page data* and therefore *converting* the source light beam into a *signal light beam*, (please see column 5, lines 30-35). The data page information is supplied to the spatial light modulator via *an encoder* (25, Figure 2). Tanaka et al teaches that the *angle* between the reference light beam and the signal light beam **can be kept constant**, (please see the arrangement explicitly shown in Figure 2). The volume holographic memory or the optical recording medium are placed on a *driving unit* (19) serves as the *stage* such that the volume holographic memory can be moved *vertically* so that the recording position for each of the hologram recording *is different*, to allow *spatial multiplexing recording* of the holograms for different pages of the data, (please see column 5, lines 7-49, column 6, lines 49-62 and column 7, lines 13-21).

With regard to amended claims 10, 29, and 31, Tanaka et al teaches that the volume holographic memory (10) is movable or shiftable vertically so that a hologram for each page of the data supplies by the spatial light modulator is recorded at **different** spatial locations of the volume holographic memory to perform spatial multiple recording, (please see column 7, lines 2-8). This allows a plurality of

pages is recorded for a set of holograms and the locations of the set of holograms are changed at a predetermined interval from a recording start position, (please see Figure 6). This is known in the art as **spatially multiplexing**. This reference however does not teach explicitly to record a second set of data pages as a second set of holograms (or new set of holograms) wherein the second set of holograms is recorded substantially at the same regions of the first set of hologram with the recording start position is shifted from the recording start position for the first set of the holograms and the shift is half of the spatial interval among the first set of the holograms. **Curtis** et al in the same field of endeavor teaches a *spatial multiplexing scheme* for recording data pages as holograms wherein the hologram is recorded as page-by-page fashion with a first set of data pages being recorded as first set of holograms (such as 10, 12, Figure 2A) and a second set of data pages being recorded as second set of holograms (20, 22) essentially at the same regions as the first set of holograms. The recording start positions for the first and second sets of holograms are *shifted* from each other with shift that is half of the interval separation between the holograms of the first set, (please see Figure 2B, column 3, lines 20-38). It would then have been obvious to one skilled in the art to apply the teachings of **Curtis** et al to modify the holographic recording apparatus and method of **Tanaka** et al to make the sets of holograms to record in such spatial multiplexing manner to increase the recording capacity and to avoid the possible cross talk among the recorded holograms.

With regard to claim 14, Tanaka et al teaches that the volume holographic memory or the optical recoding medium is comprised of a photorefractive crystal, (please see column 5, lines 46-49).

With regard to claim 31, Tanaka et al teaches that the volume holographic memory or the optical recording medium is moved vertically to achieve *spatial multiplexing recording* of the holograms. This means the page data recorded as the successive holograms are *recorded at different locations*. This means that if the recorded holograms are reproduced, the locations of maximum light intensity of the reproduced holograms will not be overlapped and will be shifted at a predetermined amount.

8. Claims 10, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to King et al (PN. 6,721,076) in view of the patent issued to Curtis et al (PN. 6,614,566).

Claims 10, 29 and 31 have been significantly amended that necessitate the new grounds of rejections.

With regard to claims 10, 29 and 31:

King et al teaches a *system and method for holographic storage* that are comprised of a *laser light source* (110, Figure 1 and 710 in Figure 7), for emitting a *coherent light beam* and a *beam splitter* (115 or 715), for separating the coherent light beam into a *reference light beam* (120 or 720) and an *object light beam* serves as *the signal light beam* (125 or 725). The optical paths for the reference light beam and the object or signal light beam are being separated by the *beam splitter and associated mirrors* such that they propagate to a *holographic storage media*, serves as the *optical recording medium*, (150 or 750) at the same time so that the interference pattern between the reference light beam and the signal light beam is recorded as the hologram. King et al teaches that a *spatial light modulator* (165 or 755) is provided in the optical path of the object or signal light beam to impose a data pattern on the object light beam for recording a *data page* as the hologram. The *data pattern* is supplied to the spatial light modulator by a pattern encoder via a *control electronic* (170), (please see column 1, line 53 to column 2, line 6, column 6 line 66 to column 7, line 48). This means the recording is supplied by the page encoder via the control electronic to the spatial light modulator. King et al teaches that the holographic storage media (150 or 750) is placed on a *moving assembly* (185), serves as the *stage*, so that the storage media is moved or translated so that the recording positions for each page information is different, to achieve the **shift or spatial multiplexing** recording method, (please see column 10, lines 49-65).

With regard amended claims 10, 29 and 31, King et al teaches that the storage media is movable or shiftable by a moving assembly (185) so that the a different hologram for each page of the data supplies by the spatial light modulator is recorded at *different* spatial locations of the storage media to perform **spatial multiple recording**, (please see column 10, lines 49-65). This is known in the art as **spatially multiplexing**. This allows a plurality of pages recorded for a set of holograms and the locations of the set of holograms are changed at a predetermined interval from a recording start position. This reference however does not teach explicitly to record a second set of data pages as a second set of holograms (or a new set of holograms) wherein the second set of holograms is recorded substantially at the same regions of the first set of hologram with the recording start position is shifted from the recording start position for the first set of the holograms and the shift is half of the spatial interval among the first set of the holograms. **King** et al in the same field of endeavor teaches a *spatial multiplexing scheme* for recording data pages as holograms wherein the hologram is recorded as page-by-page fashion with a first set of data pages being recorded as first set of holograms (such as 10, 12, Figure 2A) and a second set of data pages being recorded as second set of holograms (20, 22) essentially at the same regions as the first set of holograms. The recording start positions for the first and second sets of holograms are *shifted* from each other with shift that is half of the interval separation between the holograms of the first set, (please see Figure 2B, column 3, lines 20-38). It would then have been obvious to one skilled in the art to apply the teachings of **Curtis** et al to modify the holographic recording apparatus and method of **King** et al to make the sets of holograms to record in such spatial multiplexing manner to increase the recording capacity and to avoid the possible cross talk among the recorded holograms.

With regard to claim 31, King et al teaches that the holographic storage media or the optical recording medium is shifted to achieve *spatial or shift multiplexing recording* of the holograms. This means the page data recorded as the successive holograms are *recorded at different locations*. This

means that if the recorded holograms are reproduced, the locations of maximum light intensity of the reproduced holograms will not be overlapped and will be shifted by a predetermined amount.

9. Claims 12-13 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over patents issued to Tanaka et al and Curtis et al as applied to claims 10 and 31 above, and further in view of the patent issued to Kawano et al (PN. 6,452,890).

The system and method for holographic storage taught by Tanaka et al in combination with the teachings of Curtis et al as described for claims 10 and 31 above have met all the limitations of the claims.

With regard to claims 12 and 34, Tanaka et al does not teach that the polarization states for the signal beam or reference beam at the time of recording each page is different from the polarization state for recording each page of previously recorded hologram. **Claims 12 and 34 also have been amended** to include the phrase the optical recording medium comprises material with photo-induced birefringence. This reference however does not teach such explicitly. **Kawano** et al in the same field of endeavor teaches a hologram recording medium that is comprised of photo-induced birefringence material wherein holograms that either with the signal and reference beams having the same polarization state (Figure 3a) or orthogonal polarization state (Figure 3b) can be recorded, (please see column 9, lines 20-33). It would then have been obvious to one skilled in the art to apply the teachings of Kawano et al to use a recording medium material having photo-induced birefringent property for the benefit of allowing different polarization sensitive holograms be recorded to increase the recording density. **With regard to claims 13 and 35,** it would have been obvious to one skilled in the art to modify the hologram multiplex recording by applying the teachings of Kawano et al to use different polarization specifics (i.e. parallel or orthogonal to each other) between each page of recording to increase the multiplicity of the hologram recording for the benefit of increasing the recording density of the hologram.

With regard to claim 33, Kawano et al teaches that an analyzer (108, Figure 26) is used with the photo-detector (109) to select the reconstructed or reproduced light beam according to its polarization state to be detected by the photo-detector.

10. Claims 12-13 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over patents issued to King et al and Curtis et al as applied to claims 10 and 31 above, and further in view of the patent issued to Kawano et al (PN. 6,452,890).

The system and method for holographic storage taught by King et al in combination with the teachings of Curtis et al as described for claims 10 and 31 above have met all the limitations of the claims.

With regard to claims 12 and 34, King et al teaches that the holographic storage media includes a reflective substrate (22, Figure 2A) and a quarter wave plate or polarization shifting layer (24) such that the successive recording of the holograms by using the incident reference light beam and the reflected reference light beam will have the reference light having different polarization state.

Claims 12 and 34 have been amended to include the phrase the optical recording medium comprises material with photo-induced birefringence. This reference however does not teach such explicitly. **Kawano** et al in the same field of endeavor teaches a hologram recording medium that is comprised of photo-induced birefringence material wherein holograms that either with the signal and reference beams having the same polarization state (Figure 3a) or orthogonal polarization state (Figure 3b) can be recorded, (please see column 9, lines 20-33). It would then have been obvious to one skilled in the art to apply the teachings of Kawano et al to use a recording medium material having photo-induced birefringent property for the benefit of allowing different polarization sensitive holograms be recorded to increase the recording density. With regard to claims 13 and 35, it would have been obvious to one skilled in the art to modify the hologram multiplex recording by applying the teachings of Kawano et al to

use different polarization specifics (i.e. parallel or orthogonal to each other) between each page of recording to increase the multiplicity of the hologram recording for the benefit of increasing the recording density of the hologram.

With regard to claim 33, King et al teaches that in the reconstructing phase, the reproduced hologram (or the diffracted light beam from the recorded hologram) is reconstructed by illuminating the medium with a reference beam (320, Figure 3) and the reconstructed hologram light beam is received by the polarization beam splitter (352) with certain polarization state (serves as the analyzer) to allow the reconstructed light beam be detected by a detector, (354). Although this reference teaches a reflected instead of a transmitted signal is being detected, however such modification is considered to be obvious to one skilled in the art since it only requires rearranging part to make the polarization beam splitter transmitting and reflecting different polarization states as shown in the Figure.

11. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Tanaka et al and Curtis et al as applied to claim 10 above, and further in view of the patent issued to Hesselink et al (PN. 7,129,006).

The system and the method for holographic storage taught by Tanaka et al in combination the teachings of Curtis et al as described for claim 10 above have met all the limitations of the claims.

Tanaka et al teaches that the holographic storage medium is comprised of photorefractive material, (please see column 1, lines 15-17), however it does not teach explicitly that the medium is comprised of the materials claimed in the claims. **Hesselink** et al in the same field of endeavor teaches a variety of materials that are suitable for holographic recording medium. Hesselink et al teaches that photopolymer such as photo-addressable "side-chain" polymers can be suitable for holographic recording medium. This included *azobenzene* material, (please see column 26, lines 52-60). This material is polarization-sensitive. Hesselink et al also teaches that *photochromic* material is suitable for holographic

recording medium, (please see column 6,.lines 44-46). It would then have been obvious to one skilled in the art to apply the teachings of **Hesselink** et al to modify the holographic storage media of Tanaka et al to use the different suitable materials to record the hologram for the benefit of fulfilling different efficiency for different applications required.

12. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to King et al and Curtis et al as applied to claim 10 above, and further in view of the patent issued to Hesselink et al (PN. 7,129,006).

The system and the method for holographic storage taught by King et al in combination with the teachings of Curtis et al as described for claim 10 above have met all the limitations of the claims.

King et al teaches that the holographic storage medium is comprised of photopolymer, (please see column 7, line 53), however it does not teach explicitly that the medium is comprised of the materials claimed in the claims. **Hesselink** et al in the same field of endeavor teaches a variety of materials that are suitable for holographic recording medium. Hesselink et al teaches that photopolymer such as photo-addressable "side-chain" polymers can be suitable for holographic recording medium. This included *azobenzene* material, (please see column 26, lines 52-60). This material is polarization-sensitive. Hesselink et al also teaches that *photochromic* material is suitable for holographic recording medium, (please see column 6,.lines 44-46). It would then have been obvious to one skilled in the art to apply the teachings of **Hesselink** et al to modify the holographic storage media of King et al to use the different suitable materials to record the hologram for the benefit of fulfilling different efficiency for different applications required.

Terminal Disclaimer

13. The terminal disclaimer filed on September 14, 2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of US patent 7,218,597 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

14. Applicant's arguments with respect to amended claims 10, 12-18, 29, 31 and 33-35 have been considered but are moot in view of the new ground(s) of rejection.

15. Applicant's arguments are mainly drawn to the newly amended features in the claims and they have been fully rejected for the reasons stated in the reasons for rejection stated above.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.
/Audrey Y. Chang/
Primary Examiner, Art Unit 2872